

CLAIMS

1. A moving image coding apparatus which sequentially inputs and codes image data of frames constituting a moving image, characterized by
- 5 comprising:
- mode selection means for adaptively selecting, for each frame, a first coding mode using inter-frame correlation and a second coding mode of coding a frame separately;
- 10 segmentation means for segmenting image data of an input frame into a plurality of blocks;
- decoding means for locally decoding coded image data in accordance with an output from said mode selection means;
- 15 computation means for extracting predicted data from a locally decoded previous frame on the basis of a block image obtained by segmentation by said segmentation means and outputting a block obtained by subtracting the predicted data from the segmented block
- 20 image in the first coding mode, and outputting a block segmented by said segmentation means in the second coding mode;
- transformation means for transforming the block obtained by said computation means into spatial
- 25 frequency component data;
- code data generating means for generating intermediate code data for each bitplane comprising bit

information at each bit position which represents each frequency component value obtained by transformation;

adjusting means for adjusting a code data amount by rounding down code data of desired bitplanes of

5 generated code data from a least significant bit position to an upper bit position; and

output means for outputting code data adjusted by said adjusting means.

2. The apparatus according to claim 1, characterized
10 in that said decoding means locally decodes only image data coded in the second coding mode.

3. The apparatus according to claim 1 or 2, characterized in that the locally decoded frame to be referred to by said computation means comprises a
15 locally decoded image of image data computed in the second coding mode.

4. The apparatus according to any one of claims 1 to 3, characterized in that said transformation means comprises discrete wavelet transformation.

20 5. The apparatus according to any one of claims 1 to 4, characterized by further comprising instruction means for instructing whether or not to round down code data of bitplanes by using said adjusting means.

6. The apparatus according to any one of claims 1 to
25 5, characterized in that said mode selection means selects the second coding mode for a frame which is input for the first time after the number of input

frames becomes a predetermined number.

7. The apparatus according to any one of claims 1 to 6, characterized in that said decoding means locally decodes code data adjusted by said adjusting means.

5 8. A control method for a moving image coding apparatus which sequentially inputs and codes image data of frames constituting a moving image, characterized by comprising:

a mode selection step of adaptively selecting,
10 for each frame, a first coding mode using inter-frame correlation and a second coding mode of coding a frame separately;

a segmentation step of segmenting image data of an input frame into a plurality of blocks;

15 a decoding step of locally decoding coded image data in accordance with an output in the mode selection step;

a computation step of extracting predicted data from a locally decoded previous frame on the basis of a
20 block image obtained by segmentation in the segmentation step and outputting a block obtained by subtracting the predicted data from the segmented block image in the first coding mode, and outputting a block segmented in the segmentation step in the second coding
25 mode;

a transformation step of transforming the block obtained in the computation step into spatial frequency

component data;

a code data generating step of generating intermediate code data for each bitplane comprising bit information at each bit position which represents each

5 frequency component value obtained by transformation;

an adjusting step of adjusting a code data amount by rounding down code data of desired bitplanes of generated code data from a least significant bit position to an upper bit position; and

10 an output step of outputting code data adjusted in the adjusting step.

9. A computer program which functions as a moving image coding apparatus which sequentially inputs and codes frames constituting a moving image by being read and executed by a computer, characterized in that the
15 computer program functions as:

mode selection means for adaptively selecting, for each frame, a first coding mode using inter-frame correlation and a second coding mode of coding a frame
20 separately;

segmentation means for segmenting image data of an input frame into a plurality of blocks;

decoding means for locally decoding coded image data in accordance with an output from the mode
25 selection means;

computation means for extracting predicted data from a locally decoded previous frame on the basis of a

block image obtained by segmentation by the
segmentation means and outputting a block obtained by
subtracting the predicted data from the segmented block
image in the first coding mode, and outputting a block
5 segmented by the segmentation means in the second
coding mode;

transformation means for transforming the block
obtained by the computation means into spatial
frequency component data;

10 code data generating means for generating
intermediate code data for each bitplane comprising bit
information at each bit position which represents each
frequency component value obtained by transformation;

adjusting means for adjusting a code data amount
15 by rounding down code data of desired bitplanes of
generated code data from a least significant bit
position to an upper bit position; and

output means for outputting code data adjusted by
the adjusting means.

20 10. A computer-readable storage medium characterized
by storing a computer program defined in claim 9.

11. A moving image coding apparatus which
sequentially inputs and codes image data of frames
constituting a moving image, characterized by
25 comprising:

mode selection means for adaptively selecting,
for each frame, a first coding mode using inter-frame

correlation and a second coding mode of coding a frame separately;

segmentation means for segmenting image data of an input frame into a plurality of blocks;

5 storage means for storing at least one-frame image data;

computation means for, when the first coding mode is selected by said mode selection means, extracting predicted data from image data stored in said storage
10 means, on the basis of a block image obtained by segmentation by said segmentation means, and outputting a difference between the extracted predicted data and the block image, and when the second coding mode is selected by said mode selection means, outputting a
15 block image segmented by said segmentation means;

transformation means for transforming a block output from said computation means into spatial frequency component data;

coding means for performing coding for each
20 bitplane formed by bit information at each bit position representing each frequency component value obtained by said transformation means; and

updating means for updating said storage means with image data obtained by locally decoding code data
25 generated by said coding means when the second coding mode is selected by said mode selection means.

12. The apparatus according to claim 11,

characterized in that said coding means outputs code data $C(N_{\max})$, $C(N_{\max} - 1)$, ..., $C(N_{\max} - k)$ as effective code data up to a maximum value k satisfying

$$\sum L(C(N_{\max} - k)) \leq T$$

- 5 where N_{\max} is a bit position of a most significant bitplane, $C(i)$ is code data of n ($0 \leq n \leq N_{\max}$)th bitplane, $L(C(i))$ is a code data amount, and T is a threshold representing an allowable code amount of one frame, and discards code data $C(0)$, ...,
- 10 $C(N_{\max} - k - 1)$.
13. The apparatus according to claim 12, characterized in that the threshold T differs in the first coding mode and the second coding mode.
14. A control method for a moving image coding
- 15 apparatus which includes storage means for storing at least one-frame image data, and sequentially inputs and codes image data of frames constituting a moving image, characterized by comprising:
- 20 a mode selection step of adaptively selecting, for each frame, a first coding mode using inter-frame correlation and a second coding mode of coding a frame separately;
- a segmentation step of segmenting image data of an input frame into a plurality of blocks;
- 25 a computation means step of, when the first coding mode is selected in the mode selection step, extracting predicted data from image data stored in the

storage means, on the basis of a block image obtained by segmentation in the segmentation step, and outputting a difference between the extracted predicted data and the block image, and when the second coding
5 mode is selected in the mode selection step, outputting a block image segmented in the segmentation step;

a transformation step of transforming a block output in the computation step into spatial frequency component data;

10 a coding step of performing coding for each bitplane formed by bit information at each bit position representing each frequency component value obtained in the transformation step; and

an updating step for updating the storage means
15 with image data obtained by locally decoding code data generated in the coding step when the second coding mode is selected in the mode selection step.

15. A computer program for a moving image coding apparatus which includes storage means for storing at
20 least one-frame image data, and sequentially inputs and codes image data of frames constituting a moving image, characterized in that the computer program functions as:

mode selection means for adaptively selecting,
25 for each frame, a first coding mode using inter-frame correlation and a second coding mode of coding a frame separately;

segmentation means for segmenting image data of an input frame into a plurality of blocks;

computation means for, when the first coding mode is selected by the mode selection means, extracting
5 predicted data from image data stored in the storage means, on the basis of a block image obtained by segmentation by the segmentation means, and outputting a difference between the extracted predicted data and the block image, and when the second coding mode is
10 selected by the mode selection means, outputting a block image segmented by the segmentation means;

transformation means for transforming a block output from the computation means into spatial frequency component data;

15 coding means for performing coding for each bitplane formed by bit information at each bit position representing each frequency component value obtained by the transformation means; and

updating means for updating the storage means
20 with image data obtained by locally decoding code data generated by the coding means when the second coding mode is selected by the mode selection means.

16. A computer-readable storage medium characterized by storing a computer program defined in claim 15.

25 17. A moving image decoding apparatus which decodes coded moving image data, characterized by comprising:
storage means for storing at least one-frame

image data;

determination means for determining on the basis of input code data whether a frame of interest is code data based on a first coding mode using inter-frame correlation or code data based on a second coding mode of coding a frame separately;

decoding means for decoding code data of the frame of interest;

addition means for, when said determination means determines that the frame of interest is code data based on the first coding mode, regarding a decoding result obtained by said decoding means as difference image data, and generating a frame image by adding image data stored in said storage means to the difference image data, and when said determination means determines that the frame of interest is code data based on the second coding mode, outputting a decoding result as a frame image; and

updating means for updating said storage means with the frame image output from said addition means when said determination means determines that the frame of interest is code data based on the second coding mode.

18. A control method for a moving image decoding apparatus which includes storage means for storing at least one-frame image data and decodes coded moving image data, characterized by comprising:

a determination step of determining on the basis of input code data whether a frame of interest is code data based on a first coding mode using inter-frame correlation or code data based on a second coding mode of coding a frame separately;

a decoding step of decoding code data of the frame of interest;

an addition step of, when it is determined in the determination step that the frame of interest is code data based on the first coding mode, regarding a decoding result obtained in the decoding step as difference image data, and generating a frame image by adding image data stored in the storage means to the difference image data, and when it is determined in the determination step that the frame of interest is code data based on the second coding mode, outputting a decoding result as a frame image; and

an updating step of updating the storage means with the frame image output in the addition step when it is determined in the determination step that the frame of interest is code data based on the second coding mode.

19. A computer program for controlling a moving image decoding apparatus which includes storage means for storing at least one-frame image data and decodes coded moving image data, characterized in that the computer program functions as:

determination means for determining on the basis of input code data whether a frame of interest is code data based on a first coding mode using inter-frame correlation or code data based on a second coding mode of coding a frame separately;

decoding means for decoding code data of the frame of interest;

addition means for, when the determination means determines that the frame of interest is code data based on the first coding mode, regarding a decoding result obtained by the decoding means as difference image data, and generating a frame image by adding image data stored in the storage means to the difference image data, and when the determination means determines that the frame of interest is code data based on the second coding mode, outputting a decoding result as a frame image; and

updating means for updating the storage means with the frame image output from the addition means when the determination means determines that the frame of interest is code data based on the second coding mode.

20. A computer-readable storage medium characterized by storing a computer program defined in claim 19.